

Bhishma Dedhia

Curriculum Vitae

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Education

- 2020- **Princeton University, New Jersey (USA),**
MA+PhD in Electrical and Computer Engineering/ Artificial Intelligence,
Thesis: Concepts, Composition, Counterfactuals and Creativity
Advisor: Prof. Niraj K Jha
- 2016–2020 **Indian Institute of Technology (IIT), Bombay (India),**
Electrical Engineering, Bachelor of Technology with Honors, GPA 9.85/10, Rank 4/950, 1/120.
Thesis: On Minimizing Channel-Aware Age of Information in Multi-Sensor Networks
Advisor: Prof. Sharayu Moharir

Selected Awards and Honors

- 2023 **Princeton School of Engineering and Applied Sciences Travel Grant.**
- 2020 **Princeton Natural Sciences and Engineering First Year Fellowship.**
- 2020 **IIT Bombay Institute Silver Medal.**
- 2020 **Prof. KC Mukherjee Award for best senior thesis in EE, IIT Bombay.**
- 2019 **Narotam Sekhsaria Foundation Undergraduate Award, 2019.**
- 2019 **S.N. Bose Fellowship, Indo-U.S. Science and Technology Forum.**
- 2019 **Urvish Medh Memorial Award for academic excellence at IIT Bombay.**
- 2018, 2019 **Institute Academic Award for academic excellence at IIT Bombay.**
- 2016 **All India Rank 150 in JEE-Mains for entrance to IITs.**
- 2016 **State Rank 2/100,000 in HSC Examinations, Maharashtra.**

Research Experience

- 2020- **Graduate Researcher, Jha-Lab, Princeton University,**
Advisor: Prof. Niraj K Jha.
My PhD research spans an eclectic mixture of topics:
 - Neural Slot Interpreter for interpretable compositional generalization (ongoing)
 - Synthetic counterfactuals via spatiotemporal transformers for causal inference
 - Neural architecture search for language models
 - Fine-tuning free token pruning for efficient inference on ViT backbones
- 2022-2023 **Graduate Researcher, Princeton Computational Cognitive Science Lab,**
Advisor: Prof. Tom Griffiths.
Led a year-long collaboration between the Jha Lab and CoCoSci Lab, exploring text-free in-context learning
- 2019-2020 **Undergraduate Researcher, Stochastic Systems Lab, IIT Bombay,**
Advisor: Prof. Sharayu Moharir.
Formulated and proved efficient resource allocation algorithms for wireless networks, drawing inspiration from restless multi-armed bandits and randomized algorithms.

- 2019-2020 **Undergraduate Researcher, Reinforcement Learning Group, IIT Bombay,**
Advisor: Prof. Shivaram Kalyanakrishnan .
 Proved novel theoretical lower bounds for a generalized abstraction of the simple policy iteration method
- 2019 **Undergraduate Research Intern, Jha Lab, Princeton University,**
Advisor: Prof. Niraj K Jha.
 Designed generative models for extracting Markov blankets and causal discovery.
- 2018 **Undergraduate Research Intern, Video Communications Lab, CCU Taiwan,**
Advisor: Prof. Rachel Chiang.
 Developed saliency prediction models for omnidirectional videos

Published or accepted peer-reviewed journal papers

4. 2023 SCouT: Synthetic Counterfactuals via Spatiotemporal Transformers for Actionable Healthcare
Bhishma Dedhia* , Roshini Balasubramanian* , Niraj K Jha ACM HEALTH
3. 2023 FlexiBERT: Are Current Transformer Architectures too Homogeneous and Rigid?
 Shikhar Tuli, **Bhishma Dedhia**, Shreshth Tuli, Niraj K Jha Journal of AI Research
2. 2023 Whittle Index based Age-of-Information Aware Scheduling for Markovian Channels
 B Sombabu, **Bhishma Dedhia**, Sharayu Moharir Computer Networks and Communications
1. 2021 Saliency-driven rate-distortion optimization for 360-degree image coding
 Jui-Chiu Chiang, Cheng-Yu Yang, **Bhishma Dedhia**, Yi-Fan Char Multimedia Tools and Applications

Published or accepted peer-reviewed conference papers

4. 2023 Im-Promptu: In-Context Composition from Image Prompts
Bhishma Dedhia, Michael Chang, Jake C Snell, Thomas L Griffiths, Niraj K Jha NeurIPS
3. 2020 Lower Bounds for Policy Iteration on Multi-action MDPs
 Kumar Ashutosh* , Sarthak Consul* , **Bhishma Dedhia*** , Parthasarathi Khirwadkar* , Sahil Shah* ,
 Shivaram Kalyanakrishnan CDC
2. 2020 You Snooze, You Lose: Minimizing Channel-Aware Age of Information
Bhishma Dedhia, Sharayu Moharir WiOpt
1. 2019 Saliency Prediction for Omnidirectional Images Considering Optimization on Sphere Domain
Bhishma Dedhia, Jui-Chiu Chiang, Yi-Fan Char ICASSP

Under Review

- (arXiv) Zero-TPrune: Zero-Shot Token Pruning through Leveraging of the Attention Graph in Pre-Trained Transformers
 Hongjie Wang, **Bhishma Dedhia**, Niraj K Jha CVPR

Working Papers

- (pre) Neural Slot Interpreters: Grounding Compositional Visual Programs in Emergent Object Semantics
Bhishma Dedhia, Niraj K Jha

Graduate Coursework

Computational Models of Cognition (A+), Convex and Conic Optimization, Natural Language Processing (A+), Theoretical Reinforcement Learning, Computer Vision, Probabilistic Models of Cognition, Safety-critical Robotic Systems

Teaching

- Fall 2021 ECE 364: Predictive Data Analytics, Princeton University
 Teaching Assistant with Prof. Niraj K Jha

Mentoring

I have co-supervised the following Princeton seniors:

1. Somya Arora '21, *Thesis*: Better Healthcare via Representation Learning for Randomized Controlled Trials
2. Roshini Balasubramanian '22, *Thesis*: Digital twins for Friedreich's Ataxia: A sequence-to-sequence model of disease progression
3. Katelyn Yang '23, *Thesis*: Escaping the poverty trap: Poverty alleviation with SCouT
4. Lakshmi Murugappan (Oxford-Princeton exchange student), *Thesis*: Learning generalized representations for counterfactual inference with SCouT++

Leadership/Service

- 2023 Co-Chair for Association of South Asians at Princeton (ASAP)
- 2019-2020 Department Academic Mentor with the Electrical Engineering Department, IIT-Bombay
- 2019-2020 Student Mentor with the Institute Student Mentor Program (ISMP) at IIT Bombay
- 2017-19 Led the Electronics and Robotics Club at IIT-Bombay

Hacking Skills

Python, MATLAB, C++, Torch, Tensorflow, JAX, Verilog, Assembly, FPGAs

Distractions

Marathons, Reading, Shooting Film, Fingerstyle Guitar, Development Economics for India